

## Investigation of Thermophysical Properties of Water Samples of Kura River in Azerbaijan

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Kura is a river in the Caucasus Mountains. Starting in north-eastern Turkey, it flows through Turkey to Georgia, then to Azerbaijan, where it receives the Aras River as a right tributary, and enters the Caspian Sea. The total length of the river is 1,515 kilometres. Three-quarters of the area of Azerbaijan is situated in the bottom relief of the Kura river pool, which is the largest water artery of the country. More than 350 million m<sup>3</sup> of the chemically and biologically polluted water annually enters the Kura river pool. Pollution of the river from the territory of the neighbouring states creates an environmental tension. From this point of view, it is important to conduct, from the point of view of the security of the population, general monitoring of the dangerous substances in the transborder rivers. In the 1950s, the Soviets started building many dams and canals on the river. The river is now moderately polluted by major industrial centers in border countries. Azerbaijan has ratified the Helsinki Convention on "Protection and application of the international lakes and water currents, passing the borders" in order to achieve the solution of the interboundary water pools problem on the regional level and within the international norms. Mineralisation of the water of the Kura river rises to 800-1200 mg in the confluence of the Araz and Kura rivers, which is twice as much compared to the upper current of the Kura and 35-50% more compared to its medium current. Density of the polluting substances is elevated in this part of the river as follows: copper - 9 times sanitary norms, phenols – 6 times, and sulphates – 2-3 times.

In this presentation, we will discuss thermophysical properties analyses of water samples from the Kura river on the Azerbaijan side from west to east, over the parameter range of interest:  $(p, \rho, T)$  behaviour at  $T=(278.15$  to  $373.15)$  K and  $p=(0.101$  to  $100)$  MPa using the DMA HPM vibrating tube densimeter; density measurements at  $T=(278.15$  to  $363.15)$  K and  $p=0.101$  MPa using the DMA 5000 vibrating tube densimeter; vapor pressure measurements at  $T=(283.15$  to  $373.15)$  K using the static method; viscosity measurements at  $T=(278.15$  to  $373.15)$  K using the SVM 3000 Stabinger Viscometer, and the chemical analysis using the IRIS Intrepid II Optical Emission Spectrometer and DX 100 ion chromatography. These investigations have been examined for the first time. Using the  $(p, \rho, T)$  data, a comprehensive and accurate thermodynamic equation of state over a well-specified range of parameters of interest in ecological research is constructed. An empirical correlation for the vapour pressure and viscosity results has been developed. These equations are used to calculate thermophysical properties of these samples. An empirical correlation for the density of the Kura river water samples as a function of pressure and temperature has been developed.

